

THE NEED FOR TECHNOLOGY IMPROVEMENT PERTAINING TO SMALL MILLET PROCESSING

N. G. MALLESHI

Former Director Grade Scientist,

and

Head, Department of Grain Science and Technology
Central Food Technological Research Institute,
Mysore

malleshi@yahoo.com

09449069540

SIZE (1000 Kernel wt) AND SHAPE

**SORGHUM
(JOWAR)
(10-30g)**



**FOXTAIL MILLET
(Navane) (2 – 4g)**



**LITTLE MILLET
(Saame) (1.5 – 3g)**



**PEARL MILLET
(BAJRA)
(5-15g)**



**BARNYARD MILLET
(Udalu) (1.5 – 3g)**



**PROSO MILLET
(Panivaragu) (3-5g)**



**FINGER MILLET
(RAGI)
(2-3.5g)**



**KDO MILLET
(Harak) (2-4g)**



**BROWNTOP
(Korale) (2- 4g)**



MORPHOLOGICAL FEATURES

Finger millet



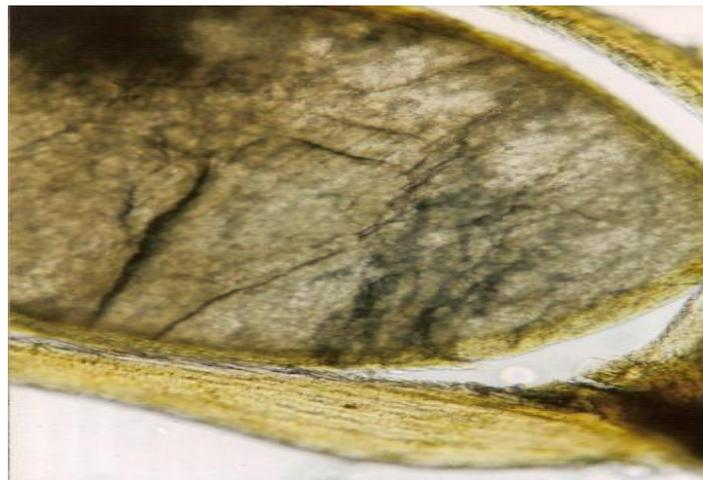
Seed coat attached rigidly to Endosperm



Foxtail, Proso and Little millets



Husk and Bran and loosely attached to Endosperm



Kodo and Barnyard millets



Multi-layered husk and bran



Why PROCESSING

Food grains are not ready-to-eat commodities, they need processing to cook for food products,

Milling and pre-processing the grains to get them in ready-to-cook or prepare them for different products is basically primary processing,

Conversion of milled grains into FLOUR, SOJI or SEMOLINA, FLAKES, POPPED GRAINS, MALT, COMPOSITE BLENDS, READY MIXES etc., are termed as Secondary processing

Preparing RTE value added product is Tertiary processing

**CONVERTING MILLETS FROM GRAINS TO EDIBLE
READY-TO-COOK AND READY-TO-EAT PRODUCTS**

- Paddy, barley, oats, rye and Small millets contain non-edible (about 20%) and non-digestible and seed coat matter (Husk)
- Wheat, sorghum, maize, ragi and bajra grains are normally contain 100% edible material
- They are starchy foods and need gelatinisation for digestion

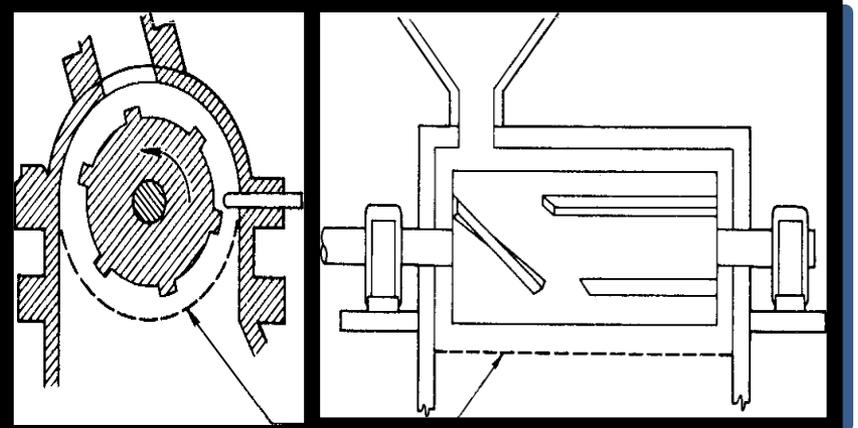
PRE-PROCESSING

- Cleaning, Aspiration, Destoning, Grading,
- Degluming or surface scoring,
- Fumigation
- Bulk Storage

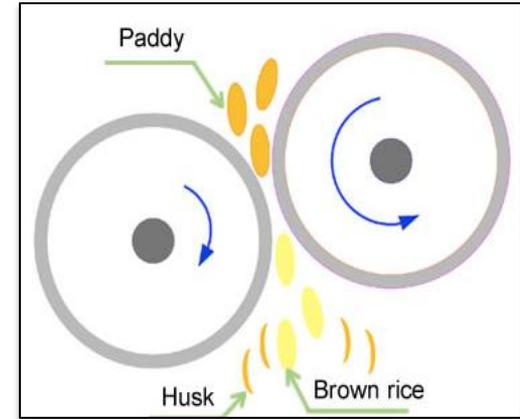
(CPA –cyclopiazonic acid)



MILLING



MILLING



SMALL MILLETS MILLS DEVELOPED

INSTITUTIONS

1. CFTRI MYSURU
2. CIPHET Ludhiana
3. CIAE BHOPAL
4. TNAU COIMBTORE
5. UAS BANGALURU
6. VPKAS ALMORA
7. UAS Dharwad
8. IIMR HYDERAABAD
9. MCGILL UNIV CANANDA
10. Dhan Foundation

MACHINERY MANUFACTURERS

1. M/s Victor machinery manufacturer at Salem
2. AVM machinery manufacturer at Salem
3. M/s. Waltech Corporation, Dharwad
4. M/S Vijay Industries, Haveri
5. Bhavani Industries, SR Patna

FINGER MILLET

Pulverising in
Disc/Hammer mills

WHOLE MEAL

Traditional food: Roti,
Thick & Thin
porridges



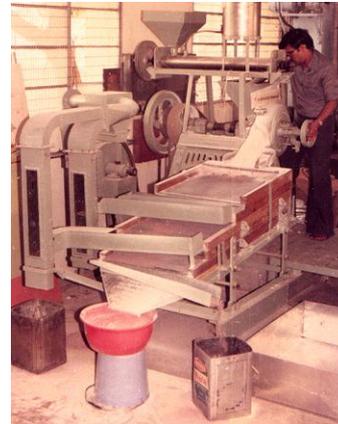
Incipient moist conditioning

Pulverising in
Disc/Hammer mills

Sieving

**REFINED
FLOUR**

Bakery, noodles, vermicelli, extrusion cooking, specialty foods



Roller milling

**HIGHLY REFINED
FLOUR**

**SEED COAT
(BRAN)**



SMALL MILLETS MILL



**FOXTAIL, LITTLE, PROSO,
KODO & BARNYARD MILLETS**

Dehulling - Rubber roll or Centrifugal sheller

Aspiration

Seed coat

**DEHULLED GRAINS CONTAINING A FEW
UN-HULLED GRAINS**

Gravity separation

Unhulled grains

Dehulled grains (Brown rice)

Debranning/ Polishing

BRAN

MILLET RICE (BHAGAR)



COMPACT SMALL MILLET MILL

Clean Graded Millet Grains



Dehulling (centrifugal or rubber roll sheller)



Gravity separator (separation of un hulled grains)



Dehulled millet (Ready -to- cook)



De-bran



Fully milled millet

(Ready - to- cook or ready for further processing to prepare value added products)



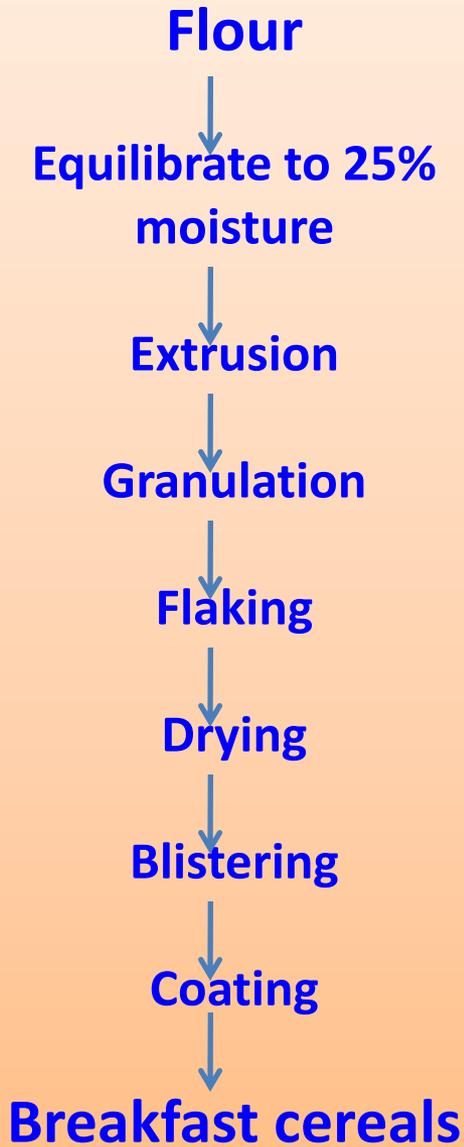
FLAKES

- A. Conventional flakes: Ready-To-Prepare (similar to rice flakes – Edge runner)**
- B. Roller flaker flakes: Suitable for toasting or Deep-oil frying**
- C. Breakfast cereals: Extrusion cooked and flaked**

FLAKING



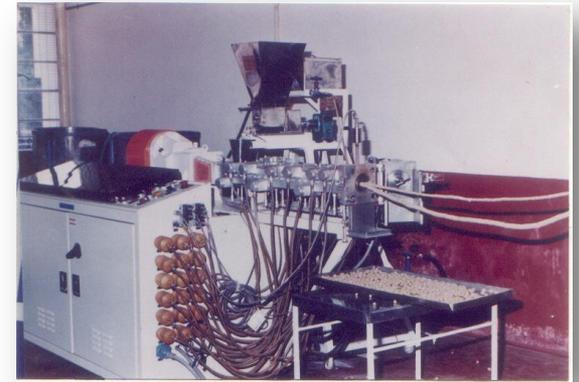
BREAKFAST CEREALS (FLAKES, PILLOWS, RINGS etc.)



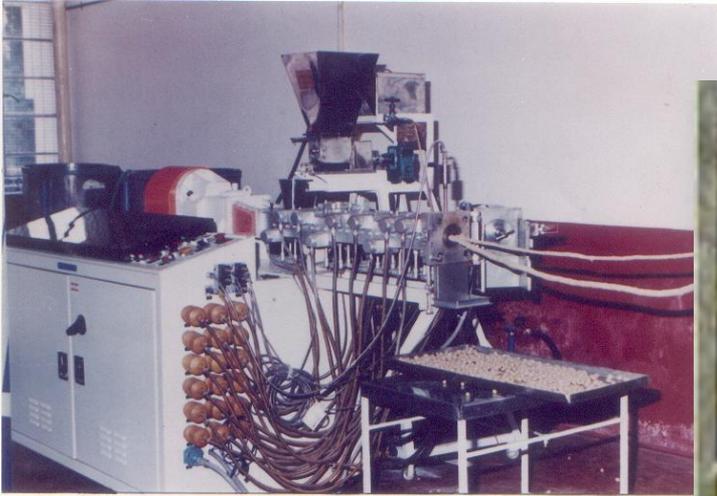
- International Markets



100% Finger millet flakes



EXTRUSION COOKING



Native Grains



**Equilibrate
(16% moisture)**



HTST



**Popped
grains**



- Low cost Snacks & Supplementary foods
- *Hurihittu, Sattu,*
- Potential ingredients for nutrition programmes

- in the case of Small millets, The husk automatically gets detached from the popped grain



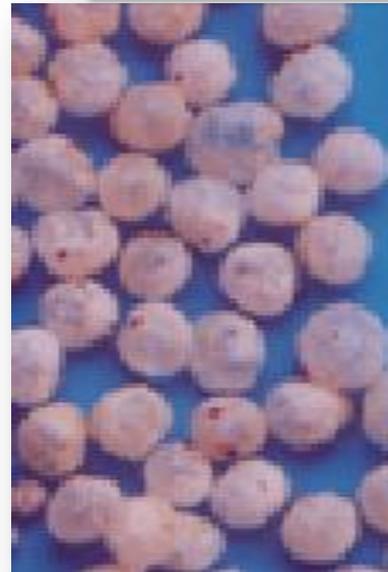
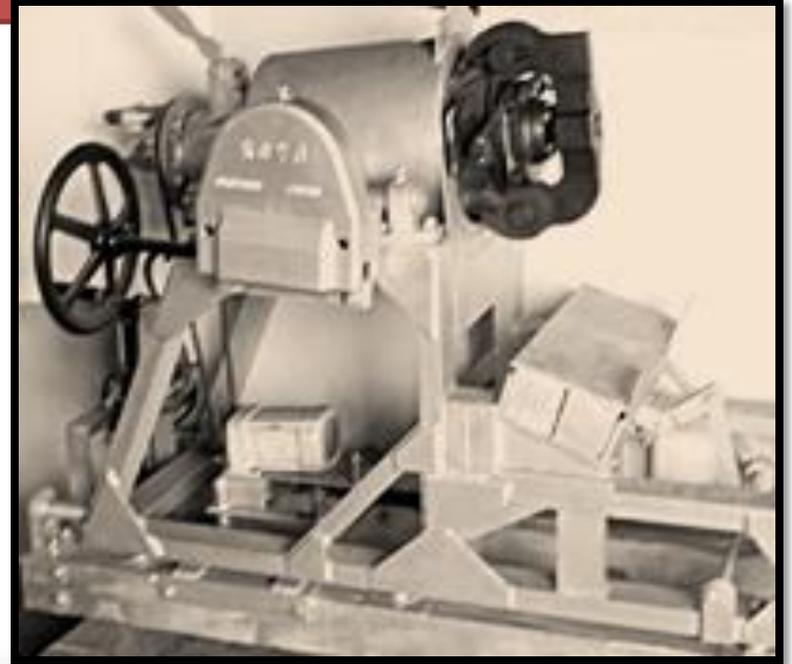
EXPANDED CEREALS

New generation RTE products from millets

- Popular technology for rice but recently tried for Sorghum and Millets

High value products, Potential ingredients:

- a. Health bars,
- b. Confectionery like crackers
- c. Cereal cakes,
- d. Thickeners in beverages



VERMICELLI / NOODLES/PASTA



Samai noodles



SORGHUM



PEARL MILLET



FINGER MILLET

- Good market potential - health benefits - high DF and **non-gluten** nature and cost benefits

- The starchy component needs to be partially pre-gelatinised and the extrudates also need to be steamed

Finger millet vermicelli - noodles are very popular but the products are made from the blend of millet and wheat

HYDROTHERMAL TREATMENT OR PARBOILING

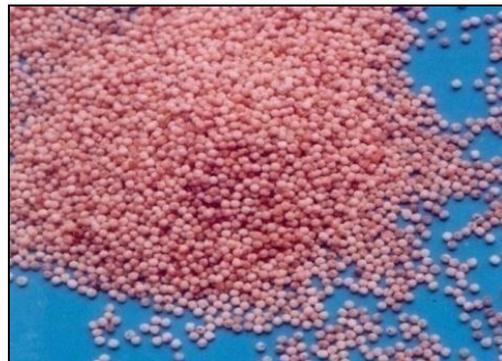
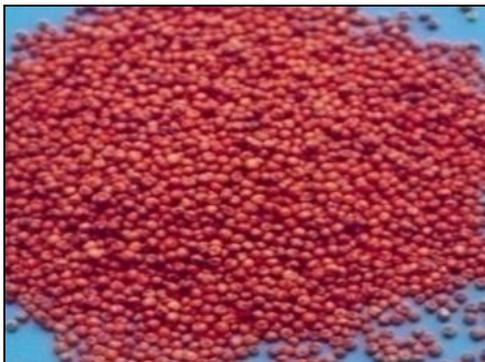
Has very high potential for millets

- **Hardens the grains and Improves milling quality, Enhances microbial safety, Better retention of nutrients – improved nutrition**
- **Enables preparation of good quality grits/semolina**
- **Better Cooking quality: Reduces stickiness, Enhances shelf or storage life, Slows down Carbohydrate digestibility**

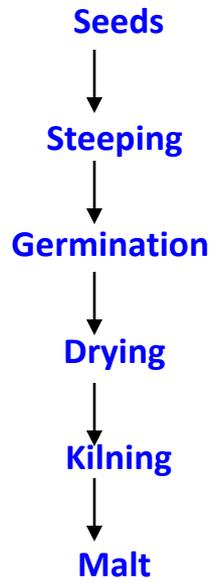


**Deserves
Attention of
millet
processors**

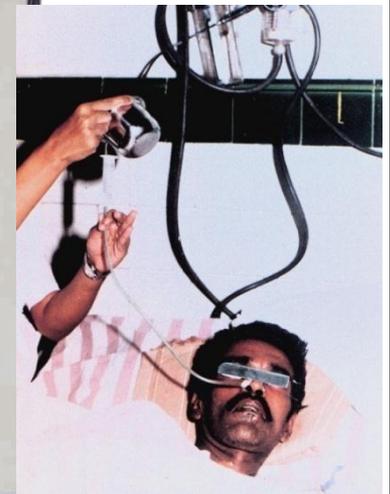
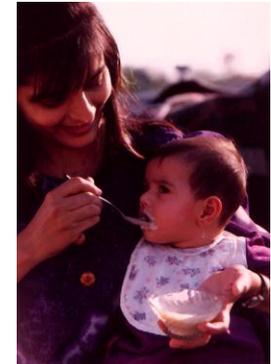
RAGI RICE- a new product from ragi



MALTING and BREWING

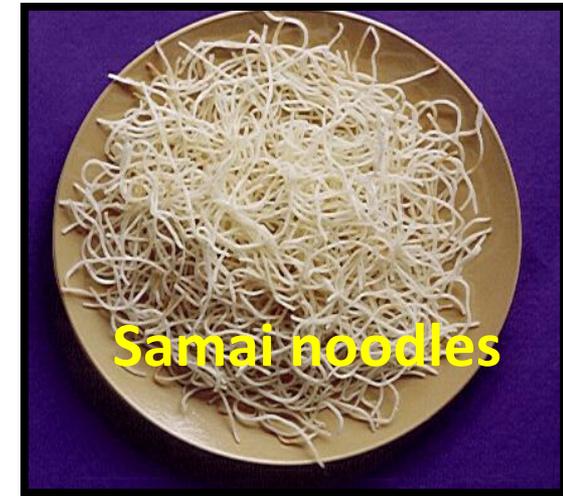


- Nutritional Up-gradation
- Enrichment with enzymes



VERMICELLI /SAVIA

Good market potential - health benefits - high DF and **non-gluten** nature and cost benefits



Samai noodles

The starchy component needs to be partially pregelatinised and the extrudates also need to be steamed



FINGER MILLET

Finger millet or ragi vermicelli - noodles very popular but the product is from the blend of millet and wheat

BREAD AND BAKES



PREPAROCESING THESE NON-GLUTENOUS GRAINS MAY HELP TO PREAPRE BAKERY PRODUCTS WITHOUT ADDING WHEAT FLOUR

VARIETIES WITH LOW GELATINISATION TEMPERATURE AND FLOUR WITH HIGH DAMAGED STARCH MAY BE ADVANTAGEOUS

Low amylose as well as high pentose containing sorghum and millets may offer advantage

HOW TO INCREASE THE FOOD AND ALLIED UTILISATION OF MILLETS ?

- **Provide them in the form of Ready-to-cook, Ready-to-eat and also as ready-to-prepare non-conventional National as well as global foods - convenience food products.**
- **Make them available at price lower than rice, wheat and maize**
- **Create awareness about their nutritional and health benefits**

VALUE ADDED PRODUCTS FROM MILLETS MARKETED

- **Noodles/vermicelli/pasta**
- **Breakfast cereals**
- **RTE snacks**
- **Health foods**
- **Beverages (milk based and & fermented)**
- **Ready-to-cook flour**
- **Multigrain flour**
- **Bakery products**
- **Multigrain food products**

NEED OF THE HOUR

- **Provide Millets in Convenience, Ready-To-Cook (RTC) and Ready-to-eat form (RTE) at Affordable Price**

CONVENIENCE IS SEEN ALONGSIDE THE HEALTH BENEFITS (single or multigrain products), CAN BE AN UNBEATABLE PROPOSITION

PROGRAMME NEED TO BE UNDERTAKEN

- 1. Integrated versatile millet mill - Design & development**
- 2. Development of millets based functional foods - Diabetes, CVD & Obesity**
- 3. Promotion of millets as NON-GLUTINOUS, ORGNIC foods and Provide Millets in convenience, ready-to-cook and ready-to-eat forms at affordable price.**

**MILLETS ARE IN OUR CULTURE AND NOW LET
THEM BECOME PART OF OUR CUISINE**

**EAT MILLET
AND
BE HEALTHY**



THANKS